## REMARKS

Claims 3-5, 11-13 and 17-19 are pending. By this Amendment, claims 1, 2, 6-10 and 14-16 are canceled and claims 3-5, 11-13, 17 and 19 are amended. Reconsideration in view of the above Amendments and the following remarks is respectfully requested.

The Office Action objects to the Specification in that the Application does not contain an Abstract. Attached hereto is an Abstract as required by 37 C.F.R. 1.72(b). Accordingly, Applicants respectfully request withdrawal of the objection to the specification.

The Office Action objects to the drawings under 37 C.F.R. 1.83(a) asserting that the drawings do not show each and every feature of the invention as specified in the claims. In particular, the Office Action asserts that "the holographic pattern for diffraction has curved pattern as recited in claim 11 must be shown or the feature(s) canceled from the claim(s)." This objection is respectfully traversed.

Applicants' respectfully submit that the curved pattern is at least illustrated in Fig. 3 of the drawings. Furthermore, additional disclosure regarding the curved pattern can at least be found on page 13, line 16-20 of the specification. Accordingly, Applicants respectfully submit that the objected to terminology is fully supported and illustrated in the figures. Withdrawal of the objection under 37 C.F.R. 1.83(a) is respectfully requested.

The Office Action objects to the drawings for failing to comply with 37 C.F.R. 1.84(p)(4) because the same reference numeral has been used to designate two different elements. This objection is respectfully traversed.

In particular, Applicants have amended the specification to indicate element 14 refers to a "non-diffraction holographic pattern." Accordingly, Applicants respectfully request withdrawal of the objection to the drawings.

The Office Action rejects claim 17 and 19 under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or to which it is most nearly connected, to make and/or use the invention. This rejection is respectfully traversed.

Applicants have amended claims 17 and 19 to recite, *inter alia*, "a method of producing a hologram member having diffraction hologram patterns and non-diffraction patterns...." Accordingly, Applicants respectfully submit the rejections of claim 17 and 18 are moot.

The Office Action further asserts that the specification fails to adequately teach what is a "non-diffraction hologram pattern" as recited in claim 17. Applicants respectfully submit that at least with reference to Figs. 1-2, as well as Figs. 6a-6c, the specification discloses how a non-diffraction hologram pattern is generated. Specifically, light from a single real laser light source 11 ("real" is used to distinguish from "imaginary" laser light sources 12a, 12b and 12c) of the semiconductor laser 10 is radiated toward a hologram module 13. The hologram module 13 has one non-diffraction hologram pattern 14 and three diffraction hologram patterns 15a, 15b and 15c. (Page 11, lines 12-24.) Light from the real laser light source 11 transmits through the non-diffraction hologram pattern 14 without diffraction, and light from the real laser light source 11 is diffracted by the diffraction hologram patterns 15a, 15b and 15c and advances towards a collimator lens 18. The non-diffraction and diffraction hologram patterns 14, 15a, 15b and 15c may be applied to hologram patterns with bright and dark interference fringes or a phase hologram pattern with binary or blazed grooves formed on glass or the like. (Page 13, lines 16-20.)

Light transmitted through the non-diffraction hologram pattern 14 shown in Fig. 2 is used for reading data on a track of the optical disk as well as for a tracking servo. Light spot 24 is a tracking servo light but is required to have a uniform intensity over the

whole area of the spot. However, as shown in Fig. 6a, the intensity distribution of light incident upon the non-diffraction hologram pattern 14 of the hologram module 13 from the real laser light source 11 has a mountain shape with an apex at its center. This intensity distribution can be improved by using a phase hologram pattern. Namely, the deeper the groove of a phase hologram pattern, the more of the amount of non-diffraction light (0-th order light) can be reduced and the more the diffraction light amount can be increased by using the reduced amount of non-diffraction light as the diffraction light. Further, the more the width of the valley (groove) is made equal to the width of a hill (non-groove), the more the amount of 0-th order light can be reduced and the more the diffraction light amount can be increased by using the reduced amount as the diffraction light. As illustrated in Fig. 6b, the depth of the groove 54 is made smaller at the position remoter from the optical axis center to thereby reduce the amount of 0-th order light and direct the reduced amount of light toward different directions. Instead of adjusting the depths of groove 54, the depths of groove 54 may be made equal and the ratio of each non-groove width to a total width of each pair of adjacent grooves 54 and non-grooves is set .... In the above manner, as illustrated in Fig. 6c, the light intensity distribution can be made uniform in some range about the optical axis center in a radial direction. By using the non-diffraction hologram pattern 14 having grooves 54 such as illustrated in Fig. 6b, the intensity distribution of incident light can be made flat. If a tracking servo signal is generated from reflected light of a light spot formed by such uniform intensity light, this tracking servo signal is stable even if the objective lens is subjected to a tracking shift. (Page 19.)

Therefore, Applicants respectfully submit that it is clear how this non-diffraction hologram pattern is generated such that the greater the amount of non-diffraction light can be reduced and the more the diffraction light amount can increase by using the

reduced amount of non-diffraction light as the diffraction light. (Pages 18, 19 and Figs. 6a-6c.)

Accordingly, Applicants respectfully submit the specification satisfies the requirements of 35 U.S.C. § 112, first paragraph. Withdrawal of the rejection of claims 17-18 and 19 under 35 U.S.C. § 112, first paragraph, is respectfully requested.

The Office Action rejects claims 2, 3, 11-13 and 19 under 35 U.S.C. § 112, second paragraph, as indefinite for failing to particularly, point out and distinctly claim the subject matter which Applicants regard as the invention. This rejection is respectfully traversed.

Applicants respectfully submit the rejection of claim 2 as moot. Regarding claim 3, Applicants have amended claim 3 to recite "that an intensity of a portion of diffraction light not used for light spot formation is reduced and the reduced intensity of that portion is added to an intensity of a portion of diffraction light used for light spot formation." Accordingly, Applicants respectfully submit that claim 3 is definite.

Claim 11 has been amended to recite wherein each of the hologram patterns for diffraction have curved patterns. Applicants respectfully submit this amendment clarifies the relationship of the hologram patterns and the curved patterns.

Likewise, comparable amendments can be made for claims 12 and 13. Accordingly, Applicants respectfully submit that claims 11-13 are definite.

The Office Action rejects claim 19 asserting that it is incomplete for omitting an essential structural cooperative relationship of elements, such omission amounting to a gap between the necessary structural connections.

Applicants respectfully submit that the amendment of claim 19 to recite "a method of producing the hologram member having diffraction hologram patterns and non-diffraction hologram patterns comprising transforming light from a real laser light source into parallel light by a collimator lens and disposing a member having at least one

pin hole in an optical path of the parallel light, when the diffraction hologram patterns are positioned at the hologram member by the light from at least one pin hole" overcomes the rejection under 35 U.S.C. § 112, second paragraph.

Accordingly, Applicants respectfully submit that all of claims 2, 3, 11-13 and 19 are definite on the 35 U.S.C. § 112, second paragraph, and respectfully request withdrawal of this rejection.

The Office Action rejects claims 1-3, 6-11 and 14-16 under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 5,828,643 to *Takeda*, et al. (hereinafter "*Takeda*"). This rejection is respectfully traversed.

Applicants respectfully submit that the rejection of claims 1-2, 6-10 and 14-16 is moot.

With respect to claims 3 and 11, claim 3 has been amended to recite that an intensity of a portion of diffraction light not used for a light spot formation is reduced and the reduced intensity of that portion is added to an intensity or portion of diffraction light used for light spot formation.

In contrast, *Takeda* is directed toward an optical pickup head apparatus. Specifically, *Takeda* is directed toward an improved optical pickup comprising a holographic optical element constructed of a pair of diffraction gratings having different diffractive conditions wherein the element is split into two by a split line near its optical axis as a border, and a diffraction generation prevention device for preventing the generation of unwanted diffraction beams from a recording medium. However, *Takeda* at least fails to teach, suggest or disclose at least the feature discussed above.

Regarding claim 11, Applicants respectfully submit that *Takeda* also fails to teach, suggest or disclose each of the hologram patterns for diffraction having curved patterns as recited in the claim.

Accordingly, since the cited reference fails to teach, suggest or disclose each and every aspect of the claims, the cited reference fails to render obvious claims 3 and 11. Withdrawal of the rejection of claims 3 and 11 under 35 U.S.C. § 103(a) is respectfully requested.

The Office Action rejects claims 4, 12 and 13 under 35 U.S.C. § 103(a) as unpatentable over *Takeda* and further in view of U.S. Patent No. 5,422,753 to *Harris* (hereinafter "*Harris*"). This rejection is respectfully traversed.

The Office Action concedes that *Takeda* does not explicitly teach that the non-diffraction light from the light source via the holographic optical element has a uniform intensity. However, the Office Action asserts that it is known in the art that a holographic diffraction grating may be designed to modulate the intensity of a light beam and that *Harris* teaches a binary diffraction grating having surface relief phase grating structure such that the non-diffraction light portion has a uniform intensity.

However, claim 4 recites that "a light spot on the recording medium formed by non-diffraction light from said real laser light source is used for servo operations" and claim 5 recites "a light spot forming optical element for ... forming a servo light spot on a recording medium."

Applicants respectfully submit that *Harris* fails to overcome the deficiencies as noted above in relation to *Takeda*. Thus, in light of the above amendments, and the dependency of claims 4, 12 and 13 from claim 3, the cited references, either alone or in combination, fail to teach, suggest or disclose each and every aspect of the claims. Accordingly, withdrawal of rejection of claims 4, 12 and 13 under 35 U.S.C. § 103(a) is respectfully requested.

The Office Action rejects claim 5 under 35 U.S.C. § 103(a) as unpatentable over *Harris*. This rejection is respectfully transversed.

Claim 5 recites, *inter alia*, "a light spot forming optical element for receiving light from said real laser light source via hologram member and forming a servo light spot on a recording medium...."

While *Harris* is directed toward a binary diffraction optical element for controlling scanning beam intensity in a raster output scanning optical system, Applicants can find no teaching, suggestion or disclosure of forming a servo light spot as recited in claim 5.

Accordingly, since the cited reference fails to teach, suggest or disclose each and every aspect of the claim, the cited reference fails to render obvious 5. Withdrawal of the rejection of claim 5 under 35 U.S.C. § 103(a) is respectfully requested.

The Office Action rejects claims 17-18 under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 4,875,761 to *Fetzer* (hereinafter "*Fetzer*"). This rejection is respectfully traversed.

Claim 17 has been amended to recite, *inter alia*, "the method of producing the hologram member having diffraction hologram patterns and non-diffraction hologram patterns...comprising...wherein the diffractional hologram patterns are positioned at the hologram member by the light from the optical elements."

In contrast, *Fetzer* is directed toward a light curtain apparatus. In particular, light from a scanning device is directed on to a row of inclined strip mirrors which are arranged one behind the other and laterally displaced relative to each other at an angle of 45° to the incident light beam. The strip mirrors form the incident light into a number of light curtains corresponding to the number of mirrors with the individual light curtains being laterally displaced in the same way as the strip mirrors. The individual light curtains then fall on to a corresponding number of deflecting mirrors which are set at an angle of 45° to the incident light curtains. The deflecting mirrors thus deflect the light curtains through an angle 90° and indeed into the same plane so that the undesired lateral

displacement is canceled and a broad light curtain is achieved which extends in a single plane.

However, *Fetzer* at least fails to teach, suggest or disclose the method of producing the hologram member as claimed. Therefore, since the cited reference fails to teach, suggest or disclose each and every aspect of the claim, the cited reference fails to render obvious claim 17. Furthermore, claim 18, which depends on claim 17, is also not rendered obvious by the cited reference for at least the reasons outlined above and the additional feature(s) that it recites. Accordingly, withdrawal of rejection of claims 17 and 18 under 35 U.S.C. § 103(a) is respectfully requested.

The Office Action rejects claim 19 under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 4,929,256 to Shepherd (hereinafter "Shepherd"). This rejection is respectfully traversed.

Claim 19 has been amended to recite, *inter alia*, "a method of producing a hologram member having diffraction hologram patterns and non-diffraction hologram patterns...comprising...disposing the member having at least one pin hole in an optical path of the parallel light, wherein the diffraction hologram patterns are positioned at the hologram member by the light from said at least one pin hole."

In contrast, Shepherd is directed toward a multi-disk cutter and method of manufacture. While the Office Action concedes that Shepherd does not teach a single collimating lens used to collimate the light from the light source, Applicants further submit that Shepherd fails to teach, suggest or disclose the method of producing a hologram member as claimed.

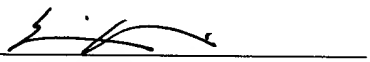
Accordingly, since the recited reference fails to teach, suggest or disclose each and every aspect of claim 19, the cited reference fails to render obvious claim 19. Withdrawal of the rejection of claim 19 under 35 U.S.C. § 103(a) is respectfully requested.

Applicants respectfully submit that claims 3-5, 11-13 and 17-19 are in condition for allowance. Favorable reconsideration and prompt allowance are respectfully requested.

Should the Examiner believe anything further is desirable in order to place the application in even better condition for allowance, the Examiner is encouraged to contact Applicants' undersigned representative at the telephone number listed below.

Respectfully submitted,

**NIXON PEABODY LLP**

By: 

Eric J. Robinson
Registration No.: 38,285
8180 Greensboro Drive Suite #800
McLean, Virginia 22102
Telephone: 703/790-9110

JHV/rms

**MARKED-UP COPY OF SPECIFICATION AND MARKED-UP COPY OF AMENDED CLAIMS.**

In the Specification, please amend the paragraph commencing on page 18 as follows:

Figs. 6A to 6C are graphs and a diagram illustrating a method of improving tracking servo light spots. Light transmitted through the non-diffraction hologram pattern 14 shown in Fig. 2 is used for reading data on a track of the optical disk as well as for tracking servo. A light spot 24 as a tracking servo light spot is required to have a uniform intensity over the whole area of the spot. However, as shown in Fig. 6A, the intensity distribution of light incident upon the non-diffraction hologram pattern 14 of the hologram module 13 from the real laser light source 11 has a mountain shape with an apex at its center. This intensity distribution can be improved by using a phase hologram pattern. Namely, the deeper the groove of a phase hologram pattern, the more the amount of non-diffraction light (0-th order light) can be reduced and the more the diffraction light amount can be increased by using the reduced amount of non-diffraction light as the diffraction light. Further, the more the width of a valley (groove) is made equal to the width of a hill (non-groove), the more the amount of 0-th order light can be reduced and the more the diffraction light amount can be increased by using the reduced amount as the diffraction light. As shown in Fig. 6B, the depth of the groove 54 is made smaller at the position remoter from the optical axis center to

thereby reduce the amount of 0-th order light and direct the reduced amount of light toward different directions. Instead of adjusting the depths of grooves [groves] 54, the depths of grooves 54 may be made equal and the ratio of each non-groove width to a total width of each pair of adjacent groove 54 and non-groove is set as al > a2 > a3 > a4 > a5 > a6 >,..., . an, where a1, a2, a3, a4, a5, a6,..., an are ratios at positions from a near position to the optical axis center to a far position therefrom in this order. In the above manners, as shown in Fig. 6C, the light intensity distribution can be made uniform in some range about the optical axis center in a radial direction. By using the non-diffraction hologram pattern 14 having grooves 54 such as shown in Fig. 6B, the intensity distribution of incident light can be made flat. If a tracking servo signal is generated from reflected light of a light spot formed by such uniform intensity light, this tracking servo signal is stable even if the objective lens is subject to a tracking shift.

In the Claims:

3. (Amended) An optical pickup device comprising:

a single real laser light source;

a hologram member for diffracting light emitted from said real laser light source to form at least one imaginary laser light source; and

a light spot forming optical element for receiving light from said hologram member and forming a plurality of light spots on tracks of a recording medium.

Wherein hologram patterns of said hologram member are determined so that diffraction light is given an inverse aberration of an aberration to be caused by optical elements in an optical path from said real laser light source to the recording medium, and [An optical pickup device according to claim 1 or 2, wherein said hologram member (13) is a phase hologram member, and] the hologram pattern [(15a-15c)] for diffraction corresponding to each imaginary laser light source [(12a-12c)] is determined so that an intensity of a portion of diffraction light not used for light spot formation is reduced and [a reduced amount of light is used as] the reduced intensity of that portion is added to an intensity of a portion of diffraction light used for light spot formation.

4. (Amended) An optical pickup device according to [any one of claim 1] claim 3, wherein a light spot [(24)] on the recording medium [(23)] formed by non-diffraction light from said real laser light source [(11)] is used for servo operations, and said hologram member [(13)] has a hologram pattern [(14)] which provides a uniform intensity of the servo light spot [(24)] in a whole light spot area.

5. (Amended) An optical pickup device comprising:

a single real laser light source [(11)]; and

a light spot forming optical element [(19)] for receiving light from said real laser light source [(11)] via a hologram member [(13)] and forming a servo light spot on a recording medium [(23)],

wherein the hologram member [(13)] has a hologram pattern [(14)] which provides a uniform intensity of the servo light spot in a whole servo light spot area.

11. (Amended) An optical pickup device according to claim 3, wherein [the hologram pattern] each of the hologram patterns for diffraction has curved patterns.

12. (Amended) An optical pickup device according to claim 4, wherein [the hologram pattern] each of the hologram patterns for diffraction has a plurality of grooves and an amount of light not to be diffracted is adjusted in accordance with depths of the grooves [(54)].

13. (Amended) An optical pickup device according to claim 4, wherein [the hologram pattern] each of the hologram patterns for diffraction has a plurality of grooves [(54)] and an amount of light not to be diffracted is adjusted in accordance with a ratio of a groove width to a non-groove width.

17. (Amended) A method of producing a hologram member having diffraction hologram patterns and non-diffraction hologram patterns [forming a plurality of imaginary laser light sources (12a, 12b, 12c...) by forming diffraction hologram patterns on a hologram member by using light from optical elements], the method comprising the steps of:

disposing a first optical element [(35a)] in an optical path from a real laser light source [(11)] to a non-diffraction hologram pattern [(14)], the first optical element partially reflecting downward light from the real laser light source;

disposing [n (n is a positive integer) optical elements (35b, 35c, ...)] at least one second optical element in an optical path of the partially reflected light, [the n optical elements] and partially reflecting the partially reflected light toward the hologram member[,] and reflecting downward residual light by the at least one second optical element disposed; and

disposing [an] a third optical element for reflecting the residual light toward the hologram member,

wherein the diffraction hologram patterns are positioned at the hologram member by the light from the optical elements.

19. (Amended) A method of producing a hologram member having diffraction hologram patterns and non-diffraction hologram patterns [forming a plurality of imaginary laser light sources (12a, 12b, 12c...) by forming diffraction hologram patterns on a hologram member by using light emitted from pin holes], the method comprising the steps of:

transforming light from a real laser light source [(11)] into parallel light by a collimator lens [(47)]; and

disposing a member [(50)] having at least one pin hole [(51a-51d)] in an optical path of the parallel light,

wherein the diffraction hologram patterns are positioned at the hologram member by the light from said at least one pin hole.